



Importance and role of Green Productivity in Industries: A Review

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Abstract

The economic development policies of most developing countries have lead to industrialization and urbanization. This results in major environmental problems, such as forest degradation, air pollution and soil degradation. Thus, it is necessary to provide and compile like of base and principle of green business, green productivity and green government in order to economize in limited resources rationally and to retain resources for next generations (Pineda, 2004). It is the combined application of appropriate productivity and environmental management tools, techniques and technologies that reduces the environmental impact of an organization's activities, products and services while enhancing profitability and competitive advantage. Using the GP approach, companies can put in place waste minimization programmes first and thereafter build a formal management system to support those programmes. By implementing GP, companies can enjoy many cost savings.

Keywords: *Green productivity, Sustainable Development, waste minimization, Eco friendly, EMS, ISO 14000*

Introduction

The economic development policies of most developing countries have lead to industrialization and urbanization. These results in major environmental problems, such as forest degradation, air pollution and soil degradation. Improvement in the quality of life is often associated with an increase in demand for goods and services. Production of goods and services often has two negative aspects on our environment. The demand for energy, initially through the burning of wood and charcoal and later by consumption of coal, oil, natural gas has resulted in depletion of natural resources and has produced adverse effects (Nguyen and Nguyen, 2001). Production of goods and services involves processes, which either use and/or discharge toxic and hazardous substances thus posing great risks to the environment and health. Such techniques may sometimes be economically attractive but are not sustainable because of their potential threats to society. Economic policies emphasizing productivity and economic growth alone may lead to an adverse irreversible environment (MOEA, 2002).

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Access to the goals of sustainable development would emphasize the necessity of carefulness in consumption of natural resources. Thus it is necessary to provide and compile of bases and principles of green business, green productivity and green government in order to economize in limited resources rationally and to retain resources for next generations (Pineda, 2004).

Green productivity has attained importance due to the following reasons (Avishek *et al.*, 2008):

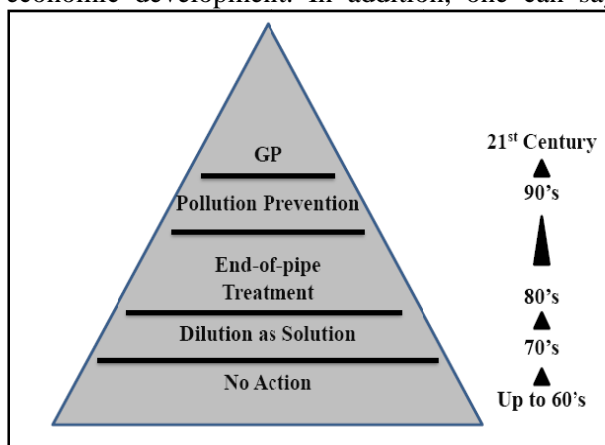
- Deteriorating Global Environment
- International Environment Treaties
- Environment & Trade
- Consumer Demand
- Need of Eco labeling
- Resource scarcity
- Economic Competitiveness
- Eco efficiency
- Occupational and Health Hazards
- Industrial Policies

Green Productivity Concept

Green Productivity (GP) was launched in 1994 in line with the 1992 Earth Summit. It laid stress on economic development and environmental protection to be the key elements of sustainable development. It was initiated in Japan as APO

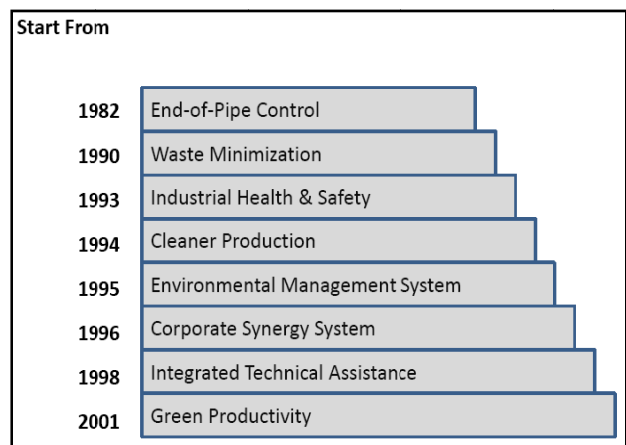
(Asian Productivity Organization) with an objective to enhance productivity and simultaneously reduce the negative impacts on the environment. The concept of Green Productivity is drawn from the integration of two important development strategies *via* productivity improvement and environment protection.

Productivity provides the framework for continued improvement while environmental protection provides the foundation for sustainable development. Therefore, green productivity is a strategy for enhancing productivity and environmental performance for overall social-economic development. In addition, one can say



(Source- MOEA, 2002)

that there are essentially two reasons for the importance of Green Productivity: firstly, innovation is a primary driver of economic growth. Green productivity enhances the process of innovation, under the umbrella of Green Productivity. Innovation, a key engine of economic growth, because part of holistic strategy to move towards a sustainable future. Secondly, productivity is essentially a marathon without a finishing line. Just as productivity was the essential strategy that enabled such country like Japan to rebuild after the second war, other Asian nations are being attracted to the lure of their success (Ahmed, 2009).



Green productivity aims at attaining quality, productivity & environmental sustainability.

1. Quality improvement
2. Productivity improvement
3. Environmental protection
4. Sustainable development

Its quiet obvious from the above aims that green productivity involves a linkage between man, his environment and occupation

The **ecological principles** which guide green productivity are given below.

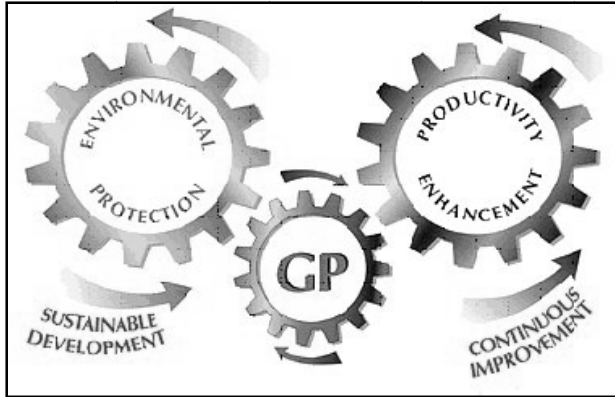
Sustainable use of Natural resources: As such earth caters to our daily needs through the vast expanse of natural resources. An optimal use of these resources will lead to sustainable development of mankind and its environment.

Protecting Ecological Biodiversity

Biodiversity plays an important role in achieving sustainability. There is a linkage between different food chains and hence a loss of one will affect the other. Hence for achieving green productivity we need tools that are self sufficient and fast in analyzing at larger scales. According to the Asian productivity Organization (APO), Japan the Tools to obtain Green productivity are:

- Cost benefit analysis
- Flow charts & Process Diagrams
- Bench marking
- Environmental Impact Assessment & Audit
- Eco Mapping
- Risk Assessment
- Life Cycle Assessment
- Energy Conservation
- Waste Reduction, Recycling, Reuse, Recovery
- Good House Keeping





(Source- MOEA, 2002)

Materials and Method

GP recommends use of various Environmental Management tools such as Environmental Management System (EMS), Design for environment (DfE), Life Cycle Assessment (LCA), Environmental Performance Evaluation (EPE) and Corporate Environmental Reporting (CER) as required in the international environmental standards under the ISO 14000 series (MOEA, 2002). The implementation and establishment of environmental management system (EMS) was first introduced following Rio De Janeiro Environment and Development Conference that resulted implementation of Agenda 21 (ANSI, 1999). International Standard Organization (ISO) developed the environmental management standard series (ISO 14000) which expanded worldwide (ISO, 1996).

Green productivity is the combined application of appropriate productivity and environmental management tools, techniques and technologies that reduce the environmental impact of an organization's activities, products and service while enhancing profitability and competitive advantage. Traditional methods of increasing productivity were not eco-friendly and the pollution control measures were not optimal for sustainable environmental protection. Green productivity programme for any unit should focus on – Increased Profitability and quality production, Environment Protection, Health & Safety, Ensure regulatory compliance and lead to Sustainable Development. Green productivity uses a set of tools & techniques that focus on eco-friendly options & alternatives in production units that can provide an overall healthy quality of life

along with increased productivity (Avishek *et al.*, 2008)

During the implementation of GP, proven productivity and management tools such as the cause –and effect analysis (also known as Ishikawa diagrams or “Fish Bone Diagram”), run charts for waste generation, Pareto diagrams, quality circle activities and the Japanese 5-S method for improving shop floor productivity are employed. GP is therefore not a new set of skills to be learned rather it is the application off well known tool and skills to a new set of priorities (Guan, 1999).

Results

The GP approach is an effective resource management tool. It can be used in the framework of an environment management system (*e.g.* ISO 14000) by delivering the continual improvement as required by the standard. GP is also applicable for companies working towards ISO 14000 certification. Using the GP approach, companies can put in place waste minimization programmes first and thereafter build a formal management system to support those programmes. By implementing GP, companies can enjoy many costs saving (Guan, 1999).

Other benefits include:

1. A better working environment
2. Better employ participation and team work
3. Greater job satisfaction
4. Improved corporate image & responsible citizenship of organization
5. Save money
6. Increase competitive advantages
7. Reduced environmental damage
8. Good reputation
9. Comply to regulation reduce the need to regulate the targeted sectors for environmental performance

Benefits to Business

1. Provide business with a competitive advantage
2. Increase productivity growth rates
3. Market share and profitability increase
4. Less operational and environmental compliance costs
5. Less generation of waste

6. Efficient resource utilization

GP- Steps, Tasks and Tool		
Steps	Tasks	Tools
Step I: Getting Started	<ul style="list-style-type: none"> ▪ Form a GP team ▪ Walk through survey and information collection 	<ul style="list-style-type: none"> ▪ Brain storming ▪ Attribute analysis ▪ Needs analysis ▪ Responsibility matrix ▪ Checklists, tally charts ▪ Flow charts and process flow diagram ▪ Material balance ▪ Benchmarking
Step II: Planning	<ul style="list-style-type: none"> ▪ Identification of problems and causes ▪ Setting objectives and targets 	<ul style="list-style-type: none"> ▪ Brainstorming ▪ Causes and effect ▪ Analysis (Ishikawa) ▪ Critical Path analysis ▪ Eco-Mapping ▪ Gantt chart ▪ Force field analysis
Step III: Generation and evaluation of GP options	<ul style="list-style-type: none"> ▪ Generation of GP option ▪ Screening and evaluation of GP options ▪ Preparation of Implementation plan 	<ul style="list-style-type: none"> ▪ Brainstorming ▪ Cost benefit analysis ▪ Eco-mapping ▪ Failure mode and effect analysis ▪ Pareto charts ▪ Program Evaluation Review Techniques (PERT)
Step IV: Implementation of GP Option	<ul style="list-style-type: none"> ▪ Implementation of selected options ▪ Training, awareness, building and developing competence 	<ul style="list-style-type: none"> ▪ Training need analysis ▪ Team briefing ▪ Responsibility matrix ▪ Critical path analysis ▪ Gantt chart ▪ Spider web diagrams
Step V: Monitoring and Review	<ul style="list-style-type: none"> ▪ Monitoring and evaluation of results ▪ Management review 	<ul style="list-style-type: none"> ▪ Solution effect analysis ▪ Eco-mapping ▪ Failure mode and effect and analysis ▪ Charts (control, tally, <i>etc.</i>)/spider-web diagram
Step VI: Sustaining GP	<ul style="list-style-type: none"> ▪ Incorporate changes ▪ Identify new/additional problem areas for continuous improvement 	<ul style="list-style-type: none"> ▪ The tools are repeated here, since the activities are looped back to the previous steps

Source: APO (2004)

Benefits to Environment

1. Economic development while maintaining productivity
2. More value to society
3. Less damage to the environment
4. Steer production and consumption patterns
5. Recycle and reuse materials
6. Conserve energy and water



Benefits to Society

1. Cleaner environment
2. Better quality of life
3. Supply of goods and services in a sustainable manner
4. Shapes society's demand

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